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REVIEW ARTICLE ON FORMULATION AND EVALUATION OF SALICYLIC ACID FACE SERUM

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Abstract
Salicylic acid and niacinamide–based serums have become essential in modern dermatological and cosmetic formulations for blackheads and whiteheads treatment, acne management, exfoliation, sebum regulation, pore cleansing, and treating uneven skin tone. The combination of salicylic acid, niacinamide, propylene glycol, sodium citrate, sodium bicarbonate, sodium benzoate, glycerine, and distilled water offers a stable, effective, non-irritant, water-based serum without the need for hyaluronic acid. Salicylic acid acts as the primary exfoliant and comedolytic agent while niacinamide strengthens the skin barrier, reduces inflammation, and minimizes hyperpigmentation. Glycerine acts as humectant and sodium citrate acts as buffering agent which contribute to pH balance, stability, skin hydration, and optimal drug delivery This article reviews the role of each ingredient, mechanism of action, formulation approach, evaluation parameters, and therapeutic benefits. Results from our research confirm that salicylic acid serums are highly effective in acne reduction, oil control, and pore purification Niacinamide enhances overall tolerability and supports skin barrier This formulation remains clear, stable, and aesthetically acceptable

Keywords: Salicylic acid; Niacinamide; Face serum; Acne treatment; Blackheads; Whiteheads.

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Introduction

Facial serums represent a modern advancement in cosmetic chemistry, designed to deliver high concentrations of active ingredients into the deeper layers of skin [1,2]. Serums are specifically water-based formulations with low viscosity and high penetration ability [1]. Unlike creams and lotions, serums contain fewer occlusives and more functional actives [1,3].

Acne, oily skin, enlarged pores, whiteheads and blackheads are common cosmetological issues among adolescents and adults [6,7]. Salicylic acid, a beta-hydroxy acid (BHA), is widely recognized for its keratolytic, comedolytic, antimicrobial, and anti-inflammatory properties [7,9]. Combining salicylic acid with niacinamide further enhances skin barrier integrity, improves hydration, reduces redness, targets post-inflammatory hyperpigmentation, and improves overall skin condition [6,8]. The elimination of hyaluronic acid from the formula reduces viscosity but does not compromise efficacy because humectants like glycerine and niacinamide maintain adequate hydration levels [1,6,10].

Ingredient Profile and Mechanism of Action

Salicylic Acid

A lipid-soluble BHA that penetrates sebaceous follicles and dissolves intercellular cement between corneocytes.

Functions: exfoliates dead skin cells, unclogs pores, reduces blackheads/whiteheads, controls sebum, anti-inflammatory, lightens dark spots [7,9].

Niacinamide

A water-soluble vitamin essential for skin barrier repair and even skin tone. Functions: reduces acne-related inflammation, minimizes enlarged pores, controls sebum, strengthens barrier, prevents pigmentation, improves texture [6,8].

Propylene Glycol
A humectant/solvent that increases penetration and dissolves salicylic acid [10,11].

Sodium Citrate
A buffering agent maintaining pH 3.5–4.5 required for salicylic acid activity and preventing crystallization [10,11].

Sodium Bicarbonate
A mild alkalizer and buffering agent assisting pH adjustment and mild exfoliation [10].

Sodium Benzoate
A preservative inhibiting microbial growth and maintaining shelf life [10,11].

Glycerine
A classic humectant retaining skin moisture, reducing dryness caused by salicylic acid, and improving slip/smoothness [10,11].

Distilled Water
Primary vehicle in aqueous serum formulations [1,4].

Formulation Development:
- The formulation table aligns with standard serum development without hyaluronic acid [1,4].
- The stepwise procedure ensures solubilization of actives, pH control, and homogeneous mixing [1,3].

Evaluation Parameters
Physical Appearance
Clear, transparent low-viscosity liquid with smooth non-sticky texture [1–4].

pH
Ideal pH 3.5–4.5 keeps salicylic acid active in non-irritant form [7,10].

Spreadability:
Ensures uniform distribution on skin [3,4].

Viscosity
Low viscosity enables deeper penetration of niacinamide and salicylic acid [1,3,6].

Stability Studies
No phase separation, no color change, clear/homogeneous and no precipitation [1,4].

Benefits of the Formulation
- Acne Reduction – salicylic acid dissolves pore blockages, niacinamide reduces inflammation [6,7].
- Oil Control – regulates excess sebum and shine [6, 7].
- Reduction of Blackheads – BHA clears hardened material inside pores [7, 9].
- Brightening & Even Tone – niacinamide reduces pigmentation and uneven tone [6,8].
- Pore Minimization – deep cleansing + anti-inflammatory response reduces pore appearance [7,8].
- Hydration Without HA – glycerine + propylene glycol + niacinamide maintain moisture [1,6,10].
- Barrier Protection – niacinamide improves epidermal lipid and barrier function [6,8].

Conclusion
This review concludes that a salicylic acid–niacinamide serum formulated without hyaluronic acid remains highly effective for acne control, exfoliation, oil regulation, blackhead treatment, and skin brightening Eliminating hyaluronic acid does not compromise serum stability or efficacy due to glycerine, niacinamide, and propylene glycol, which maintain hydration Buffers such as sodium citrate and sodium bicarbonate maintain acidic pH, while sodium benzoate ensures preservation. The formulation is clear, stable, and suitable for oily/acne-prone skin. This serum offers synergistic activity and is an ideal multipurpose skincare product amongst other formulations

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